Space Weather Forecast

Issued on Sunday, 30 July 2023 at 13:29 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: R1-R2 Blackouts likely throughout. G1-G2 Minor/Moderate storms possible 01 Aug with CME arrival. S1/Moderate Radiation Storm gradually easing.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate with two Moderate class flares observed. Strongest flare was observed from a small region in the southeast disc, which may have hidden complexity due to its oblique viewing angle. The other flare was observed from the moderately sized sunspot region in the southern centre disc, peaking at 29/1624 UTC. There are eleven spots in total on the disc, however the only other region currently of note is in the northeast. This is a stable but moderately sized region, which continues to show slow growth including the development of two weak mixed polarity regions within its intermediate spots.

No Earth-directed CMEs have been observed in the last 24 hours.

Solar Wind / Geomagnetic Activity: The onset of the faster winds from a coronal hole was observed, although this feature is largely obscured in imagery. This resulted in background winds of below 400 km/s increasing from 29/2000 UTC to become elevated at just over 500km/s. The total interplanetary magnetic field (IMF), remained weak to moderate. The north-south component, had periods of northward and southward orientated field, peaking moderately positive, but becoming predominately negative from 30/0230 UTC. Geomagnetic activity remained Quiet to Unsettled.

Energetic Particles / Solar Radiation: The observed count rate of energetic particles (high energy protons) has been above the S1 Minor Radiation storm level throughout but declining, easing after the enhancement to S2 Moderate Storm levels earlier on 29 Jul.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is likely to continue with further Moderate flares, most likely from the two moderately sized regions on the Earth-facing disc.

Solar Wind / Geomagnetic Activity: A CME which left the Sun on 28 Jul is forecast to arrive 01/1000 +/- 9 hours. Otherwise current fast winds are expected to ease day 2 (31 Jul) onward with no further coronal hole source enhancements indicated. Geomagnetic activity is expected to be Quiet with Unsettled intervals, with a chance of Active day 1 (30 Jul). The CME arrival is expected to give Active to G1 Minor Storms and a chance of G2 Moderate Storm intervals day 3 (01 Jul). These conditions perhaps continuing into day 4 (02 Aug) before easing to be mainly Quiet by the end of the period.

Energetic Particles / Solar Radiation: The count rate of energetic particles is expected to continue likely to continue declining, likely falling below the S1 Minor Storm level by the end of day 1 or early on day 2 (30-31 Jul). The CME arrival on day 3 (01 Aug) may give another brief enhancement close to, or above the S1 level before easing to background. There is a slight chance of further enhancements from any flares that occur on the disc.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	5	10	60	20
Strong	G3	No	1	5	10	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	70	70	60	60
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	100	40	15	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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